1.0 INTRODUCTION

1.1 Spring Creek Watershed Setting

Each of us lives in a watershed or area of land drained by a river or stream system (Figure 1). Despite this relatively simple definition, a watershed is actually a complex interaction between ground, water, vegetation, climate, people, and animals. Other elements such as nutrient rich agricultural and urban stormwater runoff, impervious surfaces, altered stormwater flows, and erosion are all detrimental to the health of watersheds with increasing human development. Depending on size, watersheds are also called basins, sub-basins, subwatersheds, or Subwatershed Management Units (SMUs), also known as catchments.

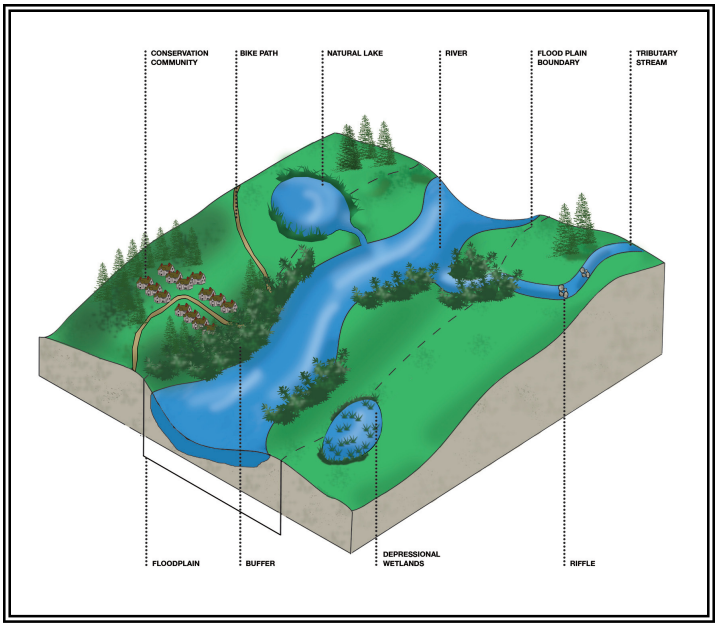

Figure 1. Hypothetical Watershed Setting.

The Spring Creek Watershed is located in northeast Illinois in portions of McHenry, Lake, Kane, and Cook Counties (Figure 2). Spring Creek and its numerous small tributaries drain approximately 26.9 square miles (17,239 acres) of land surface. The watershed is a subwatershed of the Upper Fox River Basin that drains portions of Jefferson, Kenosha, Racine, Walworth, and Waukesha counties in Wisconsin and McHenry, Lake, Kane, and Cook Counties in Illinois. The Lower Fox River Basin extends south and west through DeKalb, DuPage, Grundy, Kendall, LaSalle, Lee, and Will Counties, Illinois. The Fox River joins the Illinois River in Ottawa, Illinois. From there the Illinois River flows southwest through central Illinois before joining the Mississippi River north of St. Louis, Missouri.

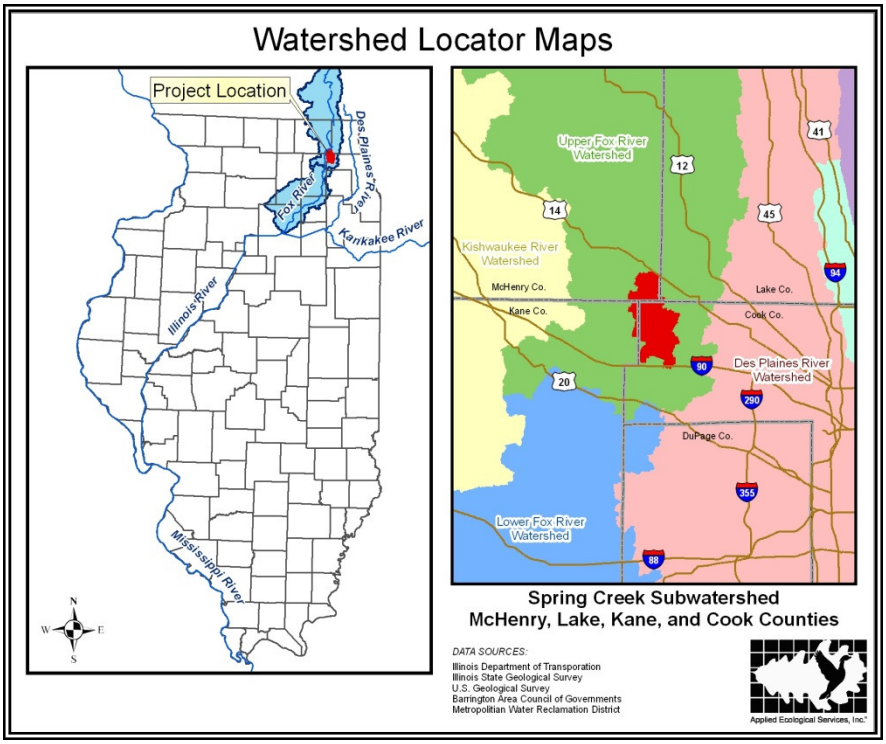

Figure 2. Watershed Locator Maps.

Pre-European settlement ecological communities in the Spring Creek watershed were balanced ecosystems exhibiting a diversity of plants and wildlife. The mosaic of prairie, oak savanna, and wetlands were largely maintained and shaped by frequent fires ignited by both lightning and the Native Americans that inhabited the area. Herds of bison and elk also helped maintain the landscape by grazing. During these times most of the water that fell as precipitation was absorbed in upland prairie and savanna communities or within the extensive wetlands that existed along stream corridors; any additional water slowly seeped into Spring Creek.

Ecological conditions changed drastically and quickly following European settlement in the mid 1800's. Large scale fires no longer occurred and bison and elk were extirpated. The majority of prairie and savanna was removed and drain tiles were installed throughout wet areas as farming became the primary land use in the early 1900's. Residential and commercial development followed which led to additional alteration and fragmentation of the natural landscape as landowners converted property to meet individual needs and roads were constructed across the watershed creating impervious surfaces that no longer allow precipitation to infiltrate into the ground.

As humans alter the landscape, streams suffer from compounding and interconnected side effects caused by urban development such as streambank erosion, invasive species establishment, degraded in-stream habitat, nutrient inputs from improper land management, and sediment deposition. Many of these side effects lead to poor water quality.

Spring Creek watershed currently maintains large expanses of both private and public open space. Most of this open space or 75% of the watershed is located within the community of Barrington Hills and is comprised of large residential lots and land owned by Cook County Forest Preserve District. Development pressure is most abundant in the southern portion of the watershed where recent residential and commercial development has occurred in South Barrington and Hoffman Estates. Smaller portions of older residential developments are found in Carpentersville, East Dundee, and Algonquin on the far west side of the watershed and in Fox River Grove in the northern tip of the watershed.

It is important to note that Spring Creek is not listed by the Illinois EPA as impaired in the most recent 2010 Illinois Integrated Water Quality Report and Section 303d List. In fact, Spring Creek is known as one of the highest quality streams in the area. Credit for this can be given to the private open space, equestrian lifestyle, and other agrarian land uses as well as support from local policy makers and the low-density development that defines the majority of the watershed. Future land use changes and development pressure could change that and local policy should be designed to encourage the continued good practices already in use.

1.2 Scope, Purpose, and Project Approach

In early 2011, Spring Creek Watershed partnership (SCW), using Citizens for Conservation (CFC) as its fiscal agent, received Illinois EPA funding through Section 319 of the Clean Water Act to produce a comprehensive "Watershed-Based Plan" for the Spring Creek watershed that meets requirements as defined by the United States Environmental Protection Agency (USEPA). Ultimately, the intent of 319 funding is to develop and implement Watershed-Based Plans designed

to achieve state water quality standards. In May 2011, SCW/CFC hired Applied Ecological Services, Inc. (AES) to develop the plan.

The primary scope of this project is the development of an ecologically-based watershed management plan for the Spring Creek watershed that focuses on protecting and improving water quality by reducing Nonpoint Source Pollution as the primary goal. Secondary goals include protection and enhancement of natural areas/open space, improving aquatic and terrestrial habitat, reduction in structural flooding, increased communication among stakeholders, and implementation of watershed education strategies.

The primary purpose of this plan is to spark interest and give stakeholders a better understanding of the Spring Creek watershed to promote and initiate plan recommendations that will accomplish the goals and objectives of the plan. This report was produced by implementing a comprehensive watershed planning approach with input from stakeholders and analysis of complex watershed issues by Ecologists, GIS Specialists, and Environmental Engineers.

SCW held regular, public meetings throughout 2011 and into 2012 to guide the watershed planning process and to encourage participation of stakeholders to develop planning and support for watershed improvement projects and programs. Information gathered during the planning process and interests, issues, and opportunities identified by SCW were addressed and incorporated into the watershed plan. The plan incorporates scientific, economic and practical rational for maintaining and improving open space to meet the majority of the goals and objectives in the plan and emphasizes entering into relationships with public, private, and non-profit entities to manage these properties to maximize watershed benefits. In addition, ideas and recommendations in this plan are designed to be updated through adaptive management that will strengthen the plan over time as additional information becomes available.

1.3 USEPA Watershed-Based Plan Requirements

In October 2003, USEPA released watershed protection guidance entitled "Nonpoint Source Program and Grant Guidelines for States and Territories." (USEPA 2008) The document was created to ensure that Section 319 funded projects make progress towards restoring waters impaired by nonpoint source pollution. AES consulted this document as well as Chicago Metropolitan Agency for Planning's (CMAP) "Guidance for Developing Watershed Implementation Plans in Illinois" (CMAP 2007) to create this Watershed-Based Plan. Having a Watershed-Based Plan will allow Spring Creek watershed stakeholders to access 319 Grant funding for management measures recommended in the plan. Under the USEPA guidance, nine "Elements" are required in order for a plan to be considered a Watershed-Based Plan. The nine Elements are as follows:

Element A: Identification of the causes and sources or groups of similar sources of pollution that will need to be controlled to achieve the pollutant load reductions estimated in the watershed-based plan;

Element B: Estimate of the pollutant load reductions expected following implementation of the management measures described under Element C below;

Element C: Description of the non-point source management measures that will need to be implemented to achieve the load reductions estimated under Element B above and an identification of the critical areas in which those measures will be needed to implement the plan;

Element D: Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon, to implement the plan;

Element E: Public information/education component that is designed to change social behavior;

Element F: Plan implementation schedule;

Element G: Description of interim, measurable milestones;

Element H: Set of criteria that can be used to determine whether pollutant loading reductions are being achieved over time;

Element I: Monitoring component to evaluate the effectiveness of the implementation efforts over time.

1.4 Planning Process

Watershed Stakeholder Planning Committee

The Spring Creek watershed planning process was initiated in September 2010 when Spring Creek Watershed partnership (SCW) invited all relevant watershed stakeholders to participate on a watershed plan steering committee. This committee met 4 times prior to hiring Applied Ecological Services, Inc. to assist in developing the watershed plan. The committee met 13 times during the planning process. The committee generally consisted of representatives from municipalities, townships, state and federal agencies, non profit organizations, and watershed residents.

SCWP meeting at Hidden Pond Estate

The SCW played an important role in developing goals and objectives for the watershed and identified problem areas and opportunities. Meetings were initiated by the Watershed Coordinator (Schumm Consulting, LLC.) and generally covered one or more watershed topics. Most meetings were devoted to development of goals and objectives, watershed impairments, watershed characteristics and assessment findings, and Action Plan items. A list of the meetings is included in Table 1. Meeting minutes are included in Appendix 1.

Table 1. Spring Creek Watershed partnership meeting schedule.

Date	Agenda	Topic(s)
Sept. 21, 2010	EPA protocol & Stakeholders	Summary of what is needed in EPA approved watershed plan & list of current and potential stakeholders
Dec. 8, 2010	SCW structure & fiscal agent	Appropriate structure of SCW discussed and CFC agreement to act as fiscal agent for group
Jan. 21, 2011	EPA grant award details; Technical Committee; contracts	EPA preliminary work plan; Technical Committee participation and roles; Contracts between CFC and Technical Committee
Mar. 23, 2011	Plan for Contracting work; Coordinator contract; Education Plan	Committee discussed how to select Consultant; Watershed Coordinator contract approved; First steps in Education Plan discussed
May 10, 2011	Consultant contract & details; Goals & Objectives	AES awarded Consultant contract and details of proposal discussed; fundraising efforts discussed; Develop preliminary goals & objectives
June 22, 2011	Consultant update; GIS data; Fundraising & budget; Goals & Objectives	AES updated committee on current status of project; GIS outstanding needs were discussed; Fundraising efforts update; Goals & Objectives were refined.
July 21, 2011	Meeting held in field; Consultant update; GIS data; Fundraising; Quarterly report; Goals & Objectives	AES updated committee on current status of land use and changes; Fundraising efforts update; Content of Illinois EPA quarterly report; Stakeholder input on land use and verification; water quality data requested.
August 17, 2011	Consultant update; Potential Impairment Sources; Fundraising	AES updated committed on status of wetlands & SMUS then held discussion to identify potential sources of impairments in the watershed
September 27, 2011	Corps Drain Tile Project in SCVFP; Tom Huddleston Drain Tile Presentation; Consultant update; Fundraising	Robbie Sliwinski and Tom Huddleson presented the proposed Corps projects and drain tile survey within SCVFP. AES updated stakeholders on progress of SMUs, wetland restoration, and impervious cover.
October 26, 2011	Discuss Corps Drain Tile Project in SCVFP; Consultant update; Fundraising & Outreach	AES presented results of BMP inventory by displaying stream reach/characteristics maps and location of assessed detention basins, lakes, and wetlands. Discussion was held regarding long term maintenance of detentions and other natural areas.
November 16, 2011	Review of Project Goals & Causes of Pollution; Fundraising Efforts	AES presented chart of causes and sources of pollution for approval. Updated goals/objectives were reviewed and approved by stakeholders.
January 17, 2012	Consultant Update; Upcoming Educational Events; Fundraising Efforts	AES presented pollutant loading model results, Green Infrastructure Network Plan, and Critical Areas
February 15, 2012	Fundraising Update; Project Updates; Upcoming Events	AES presented the Watershed Action Plan and explained how stakeholders can use the plan to obtain grant funding. The planning committee discussed the upcoming fundraising event at Sanfilippo Estate.

1.5 Using the Watershed-Based Plan

The information provided in this Watershed-Based Plan is a tool to be used by any stakeholder including elected officials, federal/state/county/municipal staff, and the general public to identify and take actions related to watershed issues. The Plan is a "living" document that can be revised and/or modified by stakeholders as needed in the future. This section of the report summarizes what the user can expect to find in each major section of the Watershed-Based Plan. The best section to review if stakeholders are most interest in becoming involved is Section 5.0, where suggested projects, costing and impacts are listed.

Section 2.0: Goals and Objectives
This section of the report contains the Spring Creek Watershed partnership's mission and Goals identified by watershed stakeholders. The goals address 1) surface and groundwater resources, 2) natural areas/open space, 3) flood damage reduction, 4) aquatic and terrestrial habitat, 5) stakeholder communication, and 6) watershed education. In addition, "measurable objectives" were developed for each goal so that progress toward meeting each goal can be measured in the future.

Section 3.0: Watershed Characteristics, Problems, & Opportunities
The overall condition of the Spring Creek watershed is examined in this section. This section includes assessments of the geology, climate, pre-European settlement ecological communities, topography, soils, jurisdictions/demographics, land use, transportation, impervious cover impacts, open space (green infrastructure), drainage system (stream, lakes, wetlands, floodplain), groundwater recharge, water quality, and pollutant loading. Resulting analysis of this data led to identification of causes and sources of watershed impairment and set the stage for identifying watershed actions.

Section 4.0: Causes & Sources of Watershed Impairment
This section of the plan includes a compilation of causes and sources of watershed impairment identified in Section 3.0 as well as impairments identified by watershed stakeholders. The basis for each impairment is then examined more closely and "Impairment Reduction Targets" developed based on the data. Finally, "Critical Areas" are identified and potential Management Measures are assigned to each and an estimate is created for the pollutant removal expected. As required by USEPA, all or portions of USEPA *Elements A, B, & C* are addressed in this section.

Section 5.0: Management Measures Action Plan
A "Management Measure Action Plan" is included in Section 5.0 to provide stakeholders with action items for watershed-wide improvements and direct stakeholders towards specific sites in the watershed where measures can be implemented resulting in the greatest watershed benefits.

The Action Plan is divided into a Programmatic Action Plan and a Site Specific Action Plan. Action recommendations are presented in table format with references to entities that would provide consulting, permitting, or other services needed to implement specific measures. The tables also outline project priority, implementation schedule, sources of technical and financial assistance, and cost estimates. The Programmatic Action Plan recommends action items with general applicability throughout the watershed whereas the Site Specific Action Plan identifies specific sites where recommended measures would reduce impairments. In addition, a watershed-wide table is included to summarize Total Units (size/length), Total Cost, and Total Estimate of Pollutant Load Reduction if all the recommendations in the Site Specific Action Plan and Education Plan are implemented. This section of the report addresses all or portion of USEPA's *Elements C & D.*

Section 6.0: Information/Education Plan
This section of the plan is designed to address USEPA *Element E* by providing an Information/ Education component to enhance public understanding and to encourage early and continued participation in selecting, designing, and implementing watershed recommendations provided in the Watershed-Based Plan. This is accomplished by providing a matrix that outlines each recommended education action, target audience, package or vehicle for implementing the action, who will lead the effort, and what the expected outcome or behavior change will be.

Sections 7.0 & 8.0: Plan Implementation & Measuring Plan Progress/Success
These sections specifically address USEPA *Elements F, G, H, and I.* A list of key stakeholders, watershed improvement projects, description of the implementation schedule, and discussion of potential funding sources in included under two monitoring components:

1. "Water Quality Monitoring Plan" that includes specific locations and methods where future sampling should occur and a set of "Criteria" that can be used to determine whether pollutant load reduction targets are being achieved over time.
2. "Report Cards" for each plan goal used to measure milestones and to determine if management measures are being implemented on schedule, how effective they are at achieving plan goals, and need for adaptive management if milestones are not being met.

Sections 9.0 & 10.0: Glossary of Terms & Literature Cited
Definitions or descriptions for many of the technical words or agencies that the user may find useful when reading or using the document is found in the Glossary of Terms (Section 10.0). Section 11.0 includes a list of mostly scientific literature that was cited throughout the report.

Appendix
The Appendix to this report is located on the attached CD. It contains original raw data, methodologies, inventory data, and other technical information referenced in the report.

1.6 Prior Studies and Work

Various studies have been completed describing and analyzing conditions within the Spring Creek watershed. This Watershed-Based Plan uses existing data to analyze and summarize work that has been completed by others and integrates new data and information. A list of known studies is summarized below. A complete reference is located in the Appendix.

1. In 2010, Metropolitan Water Reclamation District of Greater Chicago (MWRD) completed the "Detailed Watershed Plan for the Poplar Creek Watershed Study Area: Volume 1". This plan addresses stormwater problem areas, evaluates watershed conditions using hydrologic and hydraulic (H&H) models, estimates damages associated with stormwater, and evaluates potential solutions to regional stormwater problems.

2. Municipal comprehensive plans are available for the Village of Algonquin (2008), Village of Barrington Hills (2008), Village of Carpentersville (2007), Village of Fox River Grove (2007), and Hoffman Estates (2007).

3. The Army Corps of Engineers is currently completing plans to implement large scale water resource related projects within Spring Creek Valley Forest Preserve including removing drain tiles to restore wetlands, filling old channels created by farmers, restoring stream channels/banks, and restoring riparian areas by removing invasive species and introducing natives.

4. In 1999 McHenry County Conservation District (MCCD) biologists completed an "Ecological Evaluation of Spring Creek Forest Preserve". The study includes a thorough ecological and biological analysis of the northern 1,500-acre portion of the preserve. The study looks specifically at plant species/communities, breeding birds, and fish community occurring in Spring Creek. MCCD also performed a fish survey within Spring Creek in 1996.

5. In 2004 a group of citizen volunteers and ecologists began ecological restoration of large portions of Spring Creek Valley Forest Preserve.

6. Friends of the Fox River completed a stream assessment study near the sewage treatment plant in Fox River Grove in 2001-2011. Water chemistry, macroinvertebrates, mussels, plants, and stream dimensions were all examined.

7. Illinois Department of Natural Resources (IDNR) completed various studies of Spring Creek dated back to the 1940's, 60's, and 70's when fish and mussels were sampled. More recently the IDNR has conducted mussel surveys in 1988, 1993, 1994, 1995, and fish surveys in 1994, and 2002.

8. IDNR RiverWatch volunteers sampled the aquatic macroinvertebrate community at one location (Site # R0204101) within the Spring Creek watershed in 2001, 2002, 2003, and 2009. A Macroinvertebrate Biotic Index (MBI) score was calculated to evaluate the biological health and water quality.

9. Existing McHenry, Lake, Kane, and Cook Counties Geographic Information System (GIS) data for the Spring Creek watershed was obtained and used to analyze various data related to wetlands, soils, land use, and other relevant information.

10. The Village of Barrington Hills collected water quality samples at two locations along Spring Creek from 2009-2011 as part of their NPDES Phase II requirements.